REMARKS/ARGUMENTS

Under the non-final Office Action mailed on October 29, 2003, claims 1-26 were subject to examination. As set forth in detail in the office action, claims 1-6, 8, 10-11, 15-17, and 20-23 were rejected under 35 U.S.C. 102(b) as being anticipated by Kuhel (U.S. 5,004,346). Claims 7 and 9 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhel (U.S. 5,004,346), and claim 19 was rejected under 103(a) as being unpatenable over Kuhel (U.S. 5,004,346) in view of Schwomma (U.S. 3,982,835). Claims 24-26 were indicated allowable. Claims 12-14, and 18 were objected to as being dependent upon a rejected claim, but otherwise allowable if rewritten in independent form including all of the limitations of their base and any intervening claims.

By way of the present invention, claims 1, 15, 20, and 22 have been amended to provide a more refined definition of the invention so that it is more readily discernible and to provide for the Applicants protection for what they regard as the invention. Therefore, it is intended that the amendments not be construed as an admission of the correctness of the rejections of record because the Applicants do not believe that the basis for the rejections was appropriate. They do believe, however, that the claims now before the Office should be allowed in the scope presented because they define patentable subject matter that represents a significant departure from the teachings of the art. As will be apparent, there are a number of fundamental reasons why the rejections of the original claims were inappropriate and why it would be incorrect to reject the amended claims on similar grounds.

Under the Office Action, claims 1-6, 8, 10-11, 15-17, and 20-23 were rejected under 35 USC 102(b) as anticipated by Kuhel (5,004,346); the Office having taken the position that the Kuhel patent shows substantially all of the claimed elements except for a support whose presence has been inferred to have been disclosed in the Kuhel reference because inherently required.

Under 35 U.S.C. section 102, a claim is anticipated, and therefore unpatentable, when a single prior art reference discloses each and every element of the claimed invention. Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 715, 223 U.S.P.Q. 1264, 1270 (Fed. Cir. 1984). If the reference fails to suggest even one limitation of the claimed invention, then the claim is not anticipated. Atlas Powder Co. v.

E.I. du Pont De Nemours & Co., 750 F.2d 1569, 1574, 224 U.S.P.Q. 409, 41 1 (Fed. Cir. 1984).

The Present Invention

The invention comprises a system and method for automatically performing dynamic screen testing on a surface and determining its shape, from which other optical parameters of interest may be derived and reported. A measuring head, consisting of a source, beamsplitter, objective lens, and lens array with a CCD camera, is mounted on a translation stage that moves along the optic axis of the head relative to the part under test. The part under test is mounted on an appropriate support, such as a three-point support nest, that automatically centers spherical parts on the optical axis of the system.

Light is projected along the optical axis through a microscope objective or other appropriate lens to illuminate the part under test with a predetermined wavefront, preferably spherical, so that subsequent calculations are made simpler when this light is recollimated parallel to the optical axis of the system. Light reflected from the part under test passes back through the lens, after which it passes through a pellicle or cube beamsplitter towards a CCD camera. A two-dimensional array, preferably in the form of a pair of crossed lenticular screens, is placed in front of the CCD active area so that a series of sharp images are formed on the CCD array. When the system measuring head is positioned so that the focal point of the objective is located near the surface of the part under test, or near its center of curvature, the incoming nearly parallel light produces a series of spots on the CCD active area. The shifts in the pattern of spots are used to determine the shape of the surface under test. Mathematical analysis of this shape provides information on the radius of curvature of the part (if spherical), the "Spherical" and "Cylindrical" radii of curvature of a toric part (along with the angle between the major axes and a given reference axis), and the "Shape Factor" of an aspheric part. For ease of interpretation, the overall shape can be expressed in various ways, including Zernike polynomials. Software performs this analysis and facilitates providing results in many useful forms – contour plots, wire-frame models of deviation, direct readout of coefficients, direct readout of RMS surface form, direct readout of peak-to-valley difference, etc. Display screens are customizable for the engineering specialist or on-

the-floor auditing and measurement for production. Custom processing capabilities are available using Visual Basic® and an Object Linking And Embedding (OLE®) interface.

Both the original and currently amended claims require dynamically scanning a test surface with a predetermined wavefront by moving the source relative to the test surface along a axis such that the test surface returns a distorted wavefront that contains information about the topography of the test surface. The entire returned distorted wavefront is required to be sampled "everywhere corresponding to a sampled location on the test surface and position of the output beam along the optic axis. It is further required that the "local deformation" be determined at each of the sampled locations. The claims as currently amended further enhance this notion by setting forth that the wavefront is sampled in discrete portions each of which is focused to a point whose deviation is compared with the anticipated focal point corresponding to the discrete sample. It is the deviation of the sampled points that provide the basis for calculating the topography of the surface under test.

In contrast, the principal Kuhel reference does not do this as the Examiner contends because it is a system that operates interferometrically to create interferograms containing phase information from which information about surface topography must be extracted using phase analyses, mathematical procedures quite different from those described and advocated here. In Kuhel, local radii of curvature are determined in annular zones corresponding to where the curvature of the scanning wavefront matches that of the test surface. Based on the knowledge of the position of the origin of the scanning wavefront and the optical path length from the origin to the annular region where the curvatures match, the topography of the element is constructed by using the curvature matches. Thus, Kuhel does not teach to sample over the entire returning distorted wavefront, but only where there is a curvature match. For this reason alone, Kuhel is not a valid '102 reference and should be withdrawn, especially in view of the claims as currently amended. Moreover, the currently amended claims require that the sampled "discrete portions" be focused to spots (not in Kuhel) from which their "two-dimensional deviations with respect to their anticipated focal points" are measured (also not in Kuhel). Consequently, for these further reasons the '102 rejections based Kuhel should be withdrawn.

Claims 7 and 9, which ultimately depend from claim 1 via intervening claims, were rejected under 35 USC 103 as unpatentable over Kuhel.

Under 35 U.S.C. section 103, the subject matter of a claim is considered obvious, and therefore unpatentable, when the claimed "subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." The teachings of more than one reference may be considered in combination, but only when there is some teaching or suggestion to support their use in the combination. Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 E2d 281, 293, 227 U.S.P.Q. 657, 664 (Fed. Cir. 1985), *cert. denied,* 475 U.S. 1017 (1986); SmithKline Diagnostics, Inc. v. Helena Lab. Corp., 859 F2d 878,886-87, 8 U.S.EQ.2d 1468, 1475 (Fed. Cir. 1988).

As discussed above, Kuhel teaches an altogether different approach utilizing interferometric techniques for characterizing the topography of a test surface and, as such, cannot legally be relied upon as teaching the elements of the base and intervening claims from which claims 7 and 9 depend. Since the basic teaching relied upon in support of these '103 rejections does not exist in the first place, Kuhel cannot be said to suggest the additional features represented by the combination of claims 7 and 8 with their base and intervening claims. Consequently, the obviousness rejection of claims 7 and 8 should be withdrawn, particularly in view of the claims as currently amended.

Claim 19 was rejected under 35 USC 103 as unpatentable over Kuhel in view of Schwomma (3,982,835), the action stating that Kuhel teaches everything claimed except for a strobe or pulsed light source which Schwomma shows and which one skilled in the art would be motivated to use in an interferometric system to prevent blurring of interference patterns caused by movement of the system.

The rejection of claim 19 is inappropriate since it also relies on Kuhel as a principal reference in support of the proposition that the claimed invention operates by using interferometry which, as discussed above, is simply not so. Consequently, the rejection of claim 19, which relies on an improper application of Kuhel, should be likewise be withdrawn.

The objection to claims 12-14, and 18 should be withdrawn in view of the above response since these claims should now depend from allowable claims.

In view of the above response, it is respectfully submitted that this application is in condition for allowance. Should the Examiner wish to discuss any aspect of this application, please feel free to contact me.

Respectfully submitted;

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Date

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